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Smoking behavior and social contexts associated with smoking among dual-smoker couples

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Abstract

Objectives: To examine smoking behavior and social contexts related to smoking among dual-smoker couples.

Design: Cross-sectional online survey study.

Sample: A convenience sample of 183 dual-smoker couples.

Measurements: Investigator-developed survey on smoking and related social contexts.

Results: Participants smoked 16.0 cigarettes daily for 14.2 years; 48.4% shared more than half of their smoking time with their spouse. More than half made quit attempts in the past year individually (*M* = 5.3) and jointly (*M* = 2.5). Couples sharing more smoking time were more likely to be motivated to quit (*p* = .002), make quit attempts (*p* < .0001), and be interested in cessation interventions (*p* = .002); but less likely to implement home smoking bans (*p* < .001). Among those who reported quit attempts, 41% quit by themselves and 15.3% sought professional assistance. Most common reasons for relapse were chronic stress and crisis, 63.6%, however, were interested in smoking cessation services, preferably technology-based interventions.

Conclusions: We found smoking interdependence within dual-smoker couples. Despite high levels of motivation to quit, most did not utilize professional help, leading to low successful quit rates. Technology-based smoking cessation interventions incorporating spousal support and addressing stress/crisis may best assist dual-smoker couples.

KEYWORDS
dual-smoker couples, smoking, tobacco

1 | INTRODUCTION

Over the past 50 years, smoking prevalence in the United States (US) has dropped from 42% to 15% (CDC, n.d.). Interestingly, the number of clusters of smokers connected in social contexts, such as family members, co-workers and friends has decreased, yet the size of clusters (number of smokers within the clusters) has remained relatively unchanged (Christakis & Fowler, 2008). Such a pattern suggests that a group of smokers—dual-smoker couples—quit together, and one quitter can motivate the others to quit (Boyd, Ranby, MacKillop, & Lipkus, 2016). The most fundamental group of smokers connected in social contexts is married couples, dual-smoker couples.

Spousal concordance in smoking behavior has been observed in large-scale studies (Falba & Sindelar, 2008; Jackson, Steptoe, & Wardle, 2015; Venters, Jacobs, Luepker, Maiman, & Gillum, 1984). In the US, although there are wide variations in previous studies,

23%–76% of current smokers are partnered with someone who smokes (dual-smoker couples) (Choi, Pohl, Terrell, Redman, & Duffy, 2013; Kendrick et al., 1995; Rohrbaugh, Shoham, Skoyen, Jensen, & Mehl, 2012; Severson, Andrews, Lichtenstein, Wall, & Zoref, 1995; Tidey & Rohsenow, 2009). While living with a smoking spouse is associated with becoming a smoker or relapsing after quit attempts, living with a non-smoker is also associated with quitting and making more quit attempts (Falba & Sindelar, 2008; Jackson et al., 2015; Venters et al., 1984).

Dual-smoker couples are at a higher risk for smoking-related morbidity and mortality due to exposures related to both of the members' smoking (Lipkus, Ranby, Lewis, & Toll, 2013). Nonetheless, they reported fewer quit attempts, lower cessation rates, and higher relapse rates than single-smoker couples (one member smokes and one does not) (Christakis & Fowler, 2008; Dollar, Homish, Kozlowski, & Leonard, 2009; Hawkins, Hollingworth, & Campbell, 2010; Lee & Kahende, 2007; Manchón Walsh et al., 2007). Unsuccessful outcomes may be related to the social contexts of dual-smoker couples, such as home smoking policies and lack of spousal support for smoking cessation (Gilpin, White, Farkas, & Pierce, 1999; Homish & Leonard, 2005). Home smoking bans are considered social pressure on smoking. A complete home smoking ban is associated with smoking reduction and successful cessation (Gilpin et al., 1999), yet home smoking policies of dual-smokers have not been investigated.

Moreover, dual-smoker couples may mutually support both of their smoking, thus they consider smoking beneficial for their relationship and view cessation as a threat (Rohrbaugh et al., 2001), which may lead to low levels of spousal support for smoking cessation (vanDellen, Boyd, Ranby, MacKillop, & Lipkus, 2015). Such social contexts can make smoking cessation more challenging and difficult for dual-smoker couples, yet smoking behavior and social contexts associated with smoking in dual-smoking couples are poorly studied in the literature. Most of the previous studies focused on pregnant and/or postpartum women (Homish, Eiden, Leonard, & Kozlowski, 2012; Park, Chang, Quinn, Ross, & Rigotti, 2009; Severson et al., 1995), newly married couples (Dollar et al., 2009; Homish & Leonard, 2005), or health compromised patients and their spouses (Rohrbaugh et al., 2012, 2001; Shoham, Rohrbaugh, Trost, & Muramoto, 2006), limiting generalizability. A better understanding of such information would provide a foundation to develop interventions tailored to dual-smoker couples. Therefore, the aim of this study was to examine smoking behavior and social contexts related to smoking among dual-smoker couples from a sample of community dwelling adults.

2 | METHODS

2.1 | Design

This was a cross-sectional online survey study. From a convenience sample of 183 dual-smoker couples, the survey questions collected data on participant's and their spouse's smoking behaviors, quit attempts, smoking-related social contexts, comorbidities, and demographics. Dual-smoker couples were defined as married and cohabiting couples where both members currently smoke or quit smoking within the last month.

2.2 | Sample

A convenience sample of dual-smoker couples were recruited from online and offline (Dillman, Smyth, & Christian, 2014) . The inclusion criteria were those who (a) were at least 18 years of age, (b) currently smoked cigarettes or quit smoking within the past month, (c) had a spouse who currently smoked cigarettes or quit smoking within the past month, (d) were married and cohabiting with a spouse, and (e) lived in the US. There were 374 participants in the original study. Of these, 191 responses (51.1%) were excluded from the final analysis (13 incomplete surveys, 32 ineligible, 146 fraudulent data entry), resulting in the final sample of 183 (Choi, Mitchell, & Lipkus, 2017).

2.3 | Procedure

To recruit dual-smoker couples, study flyers, containing information about the study title, purpose, inclusion criteria and the link to the study consent form, were posted online via Facebook and Craigslist. Facebook ads targeted those who lived in the US, were older than 18 years of age, spoke English, and were interested in either family, parenting, marriage, and/or dating. Craigslist advertisements were posted 5 days per week in the volunteer opportunities section in major cities, including the top 10 US cities with the highest prevalence of smoking (Gallup n.d.). Recruitment occurred from July 2015 to December 2016. Study flyers were also distributed offline and posted in public places, such as coffee shops and public libraries.

As on the flyers and study advertisements, participants were instructed to provide consent online prior to beginning the survey. Once participants completed the survey, they were automatically entered into a raffle to win a $10 gift card. The appropriate Institutional Review Board (IRB) designated this study exempt.

2.4 | Measures

Smoking behaviors assessed included current smoking status, years of smoking, daily cigarette consumption, barriers/motivations to quit, use of other tobacco products (cigars, pipes, cigarillos, and snuff), and previous quit attempts. Current smokers were defined as those who currently smoked or quit smoking within the last month (Prochaska, Velicer, Fava, Rossi, & Tsoh, 2001). Additionally, nicotine dependence was assessed using the reliable and valid Fagerstrom Test of Nicotine Dependence (FTND). The scores range 0–10, with higher scores indicating a greater intensity of nicotine dependence (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). Scores ≥6 indicate high levels of nicotine dependence (Heatherton et al., 1991). Social contexts related to smoking included spouse's smoking

behaviors (current smoking status, daily cigarette consumption), joint quit attempts, and home-smoking bans.

Demographic information included age, sex, race, marital status, educational level, employment status, and occupation. Self-reported medical comorbidities (cancer, lung disease, heart disease, high blood pressure, stroke, psychiatric problems, diabetes, and arthritis) were also collected (Mukerji et al., 2007).

2.5 | Statistical analysis

Descriptive statistics (means, medians, ranges, and frequencies) were conducted for all variables. Means/medians, standard deviations, and ranges were assessed for interval-level variables, and frequencies and percentages were evaluated for nominal- and ordinal-level variables. To examine associations between smoking behavior and social contexts, chi-square tests were conducted. Power analysis was conducted to evaluate adequacy of sample size in chi-square tests. All observed power values of all chi-square tests were higher than 0.80 (Cohen, 1988). All analyses were performed using the SAS 9.4 statistical program.

3 | RESULTS

3.1 | Demographic characteristics

Table 1 shows the demographic characteristics of the sample. The mean age was 34.07 years old, ranging 19–64. About half of the sample was female (56.91%) and the majority was White (78.99%). The mean year of marriage was 7.33 years. Over a quarter of participants had a high school or less education (27.83%). The majority were employed (70.83%), and, surprisingly, about half of the sample reported one or more comorbidities (45.76%).

3.2 | Smoking behavior

On average, participants began smoking at 18.49 years of age, had smoked for 14.24 years, and smoked 16.14 cigarettes daily. Over one-third of the sample had scores of six or higher on the FTND, indicating high nicotine dependence (Table 1; Fagerström et al., 1996).

About 65% were motivated to quit within either the next month (27.85%) or 6 months (36.71%). While 46.20% made individual quit attempts for at least 24 hr in the past year, with an average of 5.27 times, only 33.30% made joint quit attempts with their spouse. Unfortunately, the most common method used in quit attempts was "quit on own" (40.98%) and fewer smokers sought assistance, such as nicotine replacement therapy (NRT) (15.30%) and the buddy system (13.66%). Dual-smoker couples identified the following reasons to resume smoking after quit attempts: chronic stress (25.14%), crisis in their life (19.13%), social/party situations (18.03%), and withdrawal symptoms (18.03%). Besides cigarettes, 23.10% used other

tobacco products, such as cigars (12.02%), cigarillos (9.29%), and pipes (8.20%).

3.3 | Social contexts associated with smoking

Table 2 describes smoking-related social contexts, including spousal smoking behavior. The spouses' mean cigarette consumption was 16.88/day, which is very similar to the participants' consumption. Over half of participants spent more than 50% of smoking time with their spouse. Smoking bans at home were not common, only 7.19% never allowed smoking, and 56.83% always allowed smoking at home.

One-third of participants reported that they made joint quit attempts in the past year, albeit the range was wide with the mean of 1.48. Health concerns (41.86%) followed by cost/money (16.28%) were the leading motivations for joint attempts. The majority of the participants (63.58%) expressed interest in smoking cessation services tailored to dual-smoker couples. For successful quit attempts, 42.22% indicated they would need a great deal of spousal support for smoking cessation; 49.30% reported they would be likely/extremely likely to be successful if their spouse helped them quit. Preferred smoking cessation interventions were web-based smoking cessation interventions (24.04%), followed by pharmacotherapy (22.95%), mobile interventions (19.13%), and workbook/video (19.13%).

To examine the associations of these social contexts with smoking among dual-smoker couples, further analyses were conducted comparing those who smoked with their spouse <50% of their smoking time with those who smoked with spouse ≥50% of their smoking time (Table 3). Compared to couples sharing less smoking time, couples sharing more smoking time were more likely to be motivated to quit ($p = .002$), made more individual and joint quit attempts ($p < .0001$), and be more interested in smoking cessation interventions ($p = .002$), but implemented fewer smoking bans at home ($p < .001$). Moreover, couples sharing more smoking time expressed more needs of spousal support for smoking cessation ($p = .002$) and expected more success if their spouse helped ($p = .015$).

4 | DISCUSSION

This study examined detailed smoking behavior and social contexts associated with smoking among dual-smoker couples. Our study findings support close interdependence and spousal concordance of smoking patterns (Falba & Sindelar, 2008; Jackson et al., 2015; Venters et al., 1984). Dual-smoker couples reported similar daily cigarette consumptions (16.14/day among participants vs. 16.88/day among spouses) and more than half of the participants shared more than half of their smoking time with their spouses.

Some smoking characteristics of the participants should be noted. Participants of this study smoked 16.14 cigarettes per day and started smoking at 18.49 years of age in average. While

TABLE 1 Characteristics of the sample

	Mean	Range
Age (n = 123)	34.07	19–64
Years married to spouse (n = 104)	7.33	1–40
Age started smoking (n = 136)	18.49	8–35
Years of smoking (n = 139)	14.24	1–43
Cigarettes smoked each day (n = 147)	16.14	1–60
FTND* (n = 162)	4.63	0–10
Number of quit attempts in past year (n = 62)	5.27	0–60

	Frequency	Percent
Sex (n = 123)		
Male	53	43.09
Female	70	56.91
Race (n = 119)		
White	94	78.99
Black	16	13.45
Others	9	7.56
Highest level of education (n = 115)		
High school or less	32	27.83
College or more	83	72.17
Employment status (n = 120)		
Employed	85	70.83
Unemployed	30	25.00
Retired	5	4.17
Comorbidities (n = 104)		
Cancer	9	7.96
Lung disease	23	20.18
Heart disease	15	12.93
High blood pressure	18	15.25
Psychiatric problems	35	30.70
Substance abuse	16	13.79
Diabetes	12	10.43
High nicotine dependence level (FTND* ≥ 6) (n = 162)	62	38.3
Thinking of quitting (n = 158)		
Within the next 30 days	44	27.85
Within the next 6 months	58	36.71
Not thinking of quitting	56	35.44
Tried to quit individually in past year (at least 24 hr) (n = 158)	73	46.20
Tried to quit jointly in past year (at least 24 hr) (n = 138)	46	33.30
Methods to assist with smoking cessation (n = 101)		
Quit on own	75	40.98
Pharmacotherapy	28	15.30
Buddy system	25	13.66
Other	43	25.1

(Continues)

TABLE 1 (Continued)

	Mean	Range
Prompted you to begin smoking again (n = 97)		
Chronic stress	46	25.14
Crisis (Death, illness, loss of job, family issues)	35	19.13
Social/party situations	33	18.03
Withdrawal symptoms	33	18.03
Boredom	21	11.48
Others	13	7.10
Used other tobacco products (n = 160)	37	23.10
Types of other tobacco products (n = 37)		
Cigars	22	12.02
Pipes of tobacco	15	8.20
Cigarillos	17	9.29
Snuff/Chewing Tobacco	9	4.92
E-cigarette	1	0.55

Abbeviations: FTND, Fagerstrom test of nicotine dependence.

the averages of daily cigarette consumption (vs. 16 cigarettes/day in the general population) and age of smoking initiation (vs. 17.9 years in the general population) are similar to the general population, more dual-smoker couples appear to start smoking early (CDC, n.d.). About 11% of dual-smokers started smoking before age of 13 years (vs. 7.3% in the American population), which is associated with increased risks for smoking-related morbidity and mortality (Choi & Stommel 2017; Lipkus et al., 2013). Indeed, the study participants reported a high prevalence of smoking-related diseases, such as lung diseases, high blood pressure, and heart diseases, which was surprising given their relatively young age. Such findings confirmed dual-smoker couples are at higher risks for smoking-related morbidity and mortality, indicating health disparities among this population (Lipkus et al., 2013).

The majority of dual-smoker couples allowed smoking at home. Furthermore, the more time they shared smoking with their spouses, the fewer smoking bans they implemented at home. Smoking bans at home are considered social pressure against smoking. Home smoking bans not only protect non-smoking family members from second-hand smoking, but also encourage smokers to quit smoking (Zablocki et al., 2014). Smoking cessation interventions should include home smoking policies, which would increase motivation/intention to quit, increase quit attempts, and lower smoking lapse/relapse (Gilpin et al., 1999; Zablocki et al., 2014).

Fortunately, dual-smoker couples reported high levels of motivation to quit smoking. Couples sharing more smoking time appeared to be more motivated compared to couples sharing less smoking time. Despite their high levels of motivation, dual-smoker couples showed low success rates in quitting (Christakis & Fowler, 2008; Dollar et al., 2009; Hawkins et al., 2010; Lee & Kahende, 2007;

TABLE 2 Social contexts associated with smoking

	Mean	Range
Cigarettes the spouse smoked each day (n = 118)	16.88	2–50
Number of joint quit attempts in past year (n = 138)	1.48	0–30
	Frequency	Percent
Smoking with spouse (n = 128)		
<50% of smoking time	56	43.75
≥50% of smoking time	72	56.25
Smoking banned at home (n = 139)		
Always allowed at home	79	56.83
Allowed sometimes or in some places	50	35.97
Never allowed	10	7.19
Motivation for joint quit attempt(s) (n = 181)		
Health concerns	18	41.86
Cost/money	7	16.28
Children/pregnancy	5	11.63
Others	13	30.23
How much do you want your spouse to help you quit (n = 124)		
Much/A great deal	57	42.22
Somewhat	40	29.63
Not at all/Little	38	28.15
Success if spouse helped them quit (n = 125)		
Likely/extremely likely	67	49.30
Neutral	48	35.30
Unlikely/Extremely unlikely	21	15.40
Interested in smoking cessation services for dual -smoker couples (n = 151)	96	63.58
Preferred smoking cessation interventions (n = 79)		
Face to face cessation counseling from health professionals	19	10.38
Telephone counseling from health professionals	32	17.49
Meeting with support groups (Buddy system)	22	12.02
Take home workbook and/or video	35	19.13
Pharmacotherapy	42	22.95
Website to help you quit smoking	44	24.04
Mobile cessation application for smoking cessation	35	19.13

Manchón Walsh et al., 2007). This may be because 41.0% quit on their own and only 15.3% utilized resources for smoking cessation. The reason why they do not use any professional help or resources is not clear, but could be a reflection of lack of available resources for them. Studies show that minorities have fewer opportunities to receive cessation interventions (Browning, Ferketich, Salsberry, & Wewers, 2008) and are thus less likely to utilize resources (Trinidad,

Pérez-Stable, White, Emery, & Messer, 2011). Such findings demonstrate a need for innovative and tailored cessation interventions for dual-smoker couples. Public health nurses are in the best position to assess dual-smokers' needs for smoking cessation and provide support and resources given their counseling skills and broad knowledge of health promotion and prevention.

Our study findings suggest several implications for public health nurses to develop cessation interventions tailored to dual-smoker couples. Firstly, smoking cessation interventions should address smoking-related social contexts, such as home smoking bans and shared smoking time. Interventions with strategies to implement home smoking bans and to encourage participants to engage in other activities not related to smoking would prevent couples from viewing cessation as a threat to their relationship. Moreover, consistent with a previous study (Siahpush & Carlin, 2006), health concerns motivated the couples to make quit attempts, whereas chronic stress and personal crisis were the top reasons for relapses. Therefore, interventions should emphasize the health effects of dual-smoker couples and include stress management strategies.

Secondly, the findings that more couples made more individual quit attempts than joint attempts (46.20% vs. 33.30%) suggest couples appeared to experience more difficulties with joint quit attempts. It is not clear why they had more difficulties with joint quit attempts. This may be related to unmet spousal support for smoking cessation. As shown in another study as well (Ranby, Lewis, Toll, Rohrbaugh, & Lipkus, 2012), dual-smoker couples expressed a strong desire for their spouse's support when trying to quit. Unmet spousal support might result in relationship dissatisfaction, which then lead to fewer joint quit attempts. Communal coping (viewing smoking as "ours" rather than "yours" or "mine") and cooperative, reinforced messages from spouses have shown to improve intent to quit smoking, confidence to quit, and actual success (Caponnetto & Polosa, 2008; Dollar et al., 2009; Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986). Therefore, cessation interventions for dual-smoker couples should encourage both members to make joint quit attempts, support each other, and increase communal coping (Caponnetto & Polosa, 2008; Dollar et al., 2009; Mermelstein et al., 1986).

While making joint quit attempts is more challenging, it has been recommended that interventions and clinical guidelines should consider targeting both members rather than only one and treat couples as a treatment unit (Cobb et al., 2014; Shoham et al., 2006). Otherwise, interventions involving only one member would have limited efficacy (Christakis & Fowler, 2008; Dollar et al., 2009; Falba & Sindelar, 2008; Homish & Leonard, 2005) as the individual would be exposed to smoking cues on a daily basis in his/her environment. If one member has a lapse/relapse, interventions should create a safe space for each member to change independently off the other (Rohrbaugh et al., 2001). Such smoking cessation programs tailored to dual-smoker couples have the potential to reduce health disparities and decrease premature deaths related to smoking, which have been burdensome nationally and globally (Allender, Balakrishnan,

TABLE 3 Differences in social contexts based on shared smoking time

	Smoking with spouse < 50% of smoking time, n (%)	Smoking with spouse ≥ 50% of smoking time, n (%)	p
Motivation to quit (n = 127)			
Yes, within the next 30 days	6 (10.91)	27 (37.50)	.002
Yes, within the next 6 months	23 (41.82)	26 (36.11)	
No, I am not thinking of quitting	26 (47.27)	19 (26.39)	
Tried to quit individually (n = 128)	9 (16.07)	49 (68.06)	<.0001
Tried to quit jointly with spouses (n = 126)	5 (8.93)	37 (52.86)	<.0001
Smoking bans at home (n = 127)			
Smoking is always allowed at home	23 (41.82)	51 (70.83)	.000
Smoking is allowed only sometimes or in some places	30 (54.55)	15 (20.83)	
Smoking is never allowed	2 (3.64)	6 (8.33)	
How much do you want your spouse to help you quit (n = 124)			
Much/a great deal	14 (25.45)	37 (53.62)	.002
Somewhat/little/not at all	41 (74.55)	32 (46.38)	
Success if spouse help quit (n = 125)			
Likely/extremely likely	21 (38.18)	42 (60.00)	.015
Neutral/unlikely/extremely unlikely	34 (61.82)	28 (40.00)	
Interested in smoking cessation intervention for dual-smoker couples (n = 128)	24 (42.86)	61 (84.72)	<.0001

Scarborough, Webster, & Rayner, 2009; Kahende, Woollery, & Lee, 2007).

Lastly, given their preference for technology-based cessation interventions, web-based or mobile phone-based interventions, both of which were effective across various populations (Myung, McDonnell, Kazinets, Seo, & Moskowitz, 2009; Whittaker, McRobbie, Bullen, & Rodgers, 2016), would better assist this population. Technology-based cessation interventions have unique advantages, such as broad reach at low costs, ability to interact between researchers and participants, and easy tailoring to individuals (Ghorai, Akter, Khatun, & Ray, 2014; Smith, 2015). However, no web-based or mobile phone-based interventions are tailored to dual-smoker couples yet.

There are several limitations to consider. Self-reporting and recall bias may exist as the data were collected based on participants' ability to remember, particularly when recall periods are long (Jupp, 2006). All data were based on reports from only one member of a dual-smoker couple. Reports from one member can be biased, especially when the sample is not balanced in sex (Lewis et al., 2006; Rohrbaugh, Shoham, & Dempsey, 2009). However, given our sample was balanced between male and female participant, it is unlikely this bias was introduced. Future studies including both members of dual-smoker couples will be needed to verify the study findings. Missing data may also result in biased findings (Westreich, 2012). However, additional analysis—Little's MCAR (Missing Completely at Random) test—showed that the data were missing completely at random (χ^2 = 625.585, df = 592, p = .164). Thus, the influence of missing data on analysis should be minimal. Study findings may be also biased due to the study design (online survey study) and the study sample. Our study sample may be composed of more participants who were tech-savvy given the online-survey study design, thus some of the findings, such as preference of technology-based cessation interventions, can be unique to this sample. Therefore, the study findings may not be generalizable to non-tech-savvy populations. Additionally, the survey did not include questions about sexual identity and gender of spouse, thus, we were not able to compare patterns of smoking between same sex and different sex couples (Gamarel et al., 2016).

5 | CONCLUSIONS

Dual-smoker couples showed interdependence and spousal concordance of smoking patterns. They reported more difficulties with joint quit attempts than individual quit attempts, albeit they had high levels of motivation to quit, and preferred technology-based interventions. Such findings provide implications for smoking cessation interventions tailored to dual-smoker couples. Technology-based cessation interventions addressing smoking bans, spousal support, and stress and health concerns may reduce health disparities and prevent premature deaths among dual-smoker couples.

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